

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

Droughtscape, Quarterly Newsletter of NDMC,  
2007-

Drought -- National Drought Mitigation Center

---

Spring 2019

## DroughtScape- Spring 2019

Cory Matteson

Follow this and additional works at: <https://digitalcommons.unl.edu/droughtscape>



Part of the [Atmospheric Sciences Commons](#), [Climate Commons](#), [Environmental Indicators and Impact Assessment Commons](#), [Environmental Monitoring Commons](#), [Fresh Water Studies Commons](#), [Hydrology Commons](#), [Meteorology Commons](#), [Natural Resources and Conservation Commons](#), [Natural Resources Management and Policy Commons](#), [Other Earth Sciences Commons](#), [Other Environmental Sciences Commons](#), [Sustainability Commons](#), and the [Water Resource Management Commons](#)

---

This Article is brought to you for free and open access by the Drought -- National Drought Mitigation Center at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Droughtscape, Quarterly Newsletter of NDMC, 2007- by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.



# DroughtScape

Quarterly Newsletter

**Spring** | 2019

**Wet and cool conditions bring drought relief  
to the West**

**New research examines drought effects on  
state recreation areas**

**U.S.-affiliated Pacific Islands now part of U.S.  
Drought Monitor**

**...and more**



**NATIONAL DROUGHT  
MITIGATION CENTER**  
UNIVERSITY OF NEBRASKA

**Drought Science.** Planning Sense.



## About the cover photo

View of Missouri River flooding from Wyman Heights near Omaha, Nebraska, on March 17, 2019. To view or download the original image on Flickr, click here.

Photo: Shelby L. Bell, Flickr, CC BY 2.0 license.

## Contents

From the director .....	2
Wet and cool conditions bring drought relief to the West .....	3
Notable numbers from Q1 .....	5
Drought impact summary, 1st quarter 2019 .....	6
New research examines drought effects on state recreation areas ...	8
At Ethiopian space science workshop, NDMC climatologist sees promise in preparing for drought...	9
U.S.-affiliated Pacific Islands now part of U.S. Drought Monitor .....	11
Water conservation tips for drought, flood and other disasters .....	12
Upcoming events .....	13



[drought.unl.edu](http://drought.unl.edu)



[@DroughtCenter](https://twitter.com/DroughtCenter)



[/NationalDroughtMitigationCenter](https://www.facebook.com/NationalDroughtMitigationCenter)



[go.unl.edu/droughtflix](http://go.unl.edu/droughtflix)



Cory Matteson, *Editor*  
[rmatteson2@unl.edu](mailto:rmatteson2@unl.edu)



The University of Nebraska–Lincoln is an equal opportunity educator and employer.

© 2019 National Drought Mitigation Center

## From the Director



**Mark Svoboda**

As I write this column, less than 4% of the United States is in drought, which is the lowest areal coverage since we began the U.S. Drought Monitor (USDM) back in 1999. You can find more details on this in our story located on page 3. In addition, California is now “drought-free” for the first time since 2011, according to the USDM. Keep in mind that being free of drought doesn’t mean free of “impacts” or free of water worries. Recovery often lags (sometimes for years) well behind the rains and snows that have returned this winter. There are still plenty of lessons to be learned and more work to do as recovery continues across the West.

I mention these facts above, as now is the perfect time to plan and prepare for the next drought, which we know Mother Nature will bring our way again at some point in the future. Dealing with drought and its effects works best when you aren’t trying to manage it in the moment. Since our inception in 1995, the NDMC has constantly advocated taking a proactive, mitigation-based approach to drought risk management, as opposed to a crisis-based, response-oriented approach, which is still all too common when it comes to drought. Please check out all of our drought planning resources freely available on the NDMC website at: [drought.unl.edu](http://drought.unl.edu). Just follow the Planning tab at the top of our home page and let us know if you have any questions we can help you with.

As we celebrate 20 years of the making of the weekly USDM with our partners at NOAA and USDA, it is my pleasure to announce that we have collaboratively launched weekly operational mapping of the U.S.-affiliated Pacific Islands (USAPI). Yes, tropical islands can indeed experience drought and can be quite risk-prone when it comes to fresh water sources. This has been in the works for many years and is a testament to the hard work of USDM author Richard Heim and others in laying the groundwork for this to come to fruition. The feature story on page 11 spells out the particulars. Next will be operational mapping of the U.S. Virgin Islands later this year if all stays on schedule. You can find this new addition to the USDM at: [droughtmonitor.unl.edu](http://droughtmonitor.unl.edu). It is personally very rewarding to see the USDM network continue to grow and expand in usage. The USAPI locals are very excited by this new USDM service and are personally involved in the process as well!

Finally, on behalf of the NDMC, I would like to acknowledge and give my heartfelt thanks for their dedicated work to the NDMC to Nicole Wall (Outreach and Research Specialist) and Theresa Jedd (Environmental Policy Post Doc), who are both leaving the NDMC for new opportunities abroad. Nicole will take her skills to Ethiopia to work more in the area of climate/drought and health related issues, while Theresa and her family are moving to Munich, Germany, to become faculty members at the Technical University of Munich. They will both be missed and we wish them the best in this new exciting chapter of their careers and lives! We have also welcomed a new Communications Specialist to the NDMC team. Cory Matteson has hit the ground running and you will see his work throughout this edition of DroughtScape. You’ll also see him contribute to our social media efforts. Welcome aboard, Cory! □

# Wet and cool conditions bring drought relief to the West

By Claire Shield

National Drought Mitigation Center  
Climatologist

*Drought classifications are based on the U.S. Drought Monitor. Details on the extent and severity of drought are online: [droughtmonitor.unl.edu](http://droughtmonitor.unl.edu).*

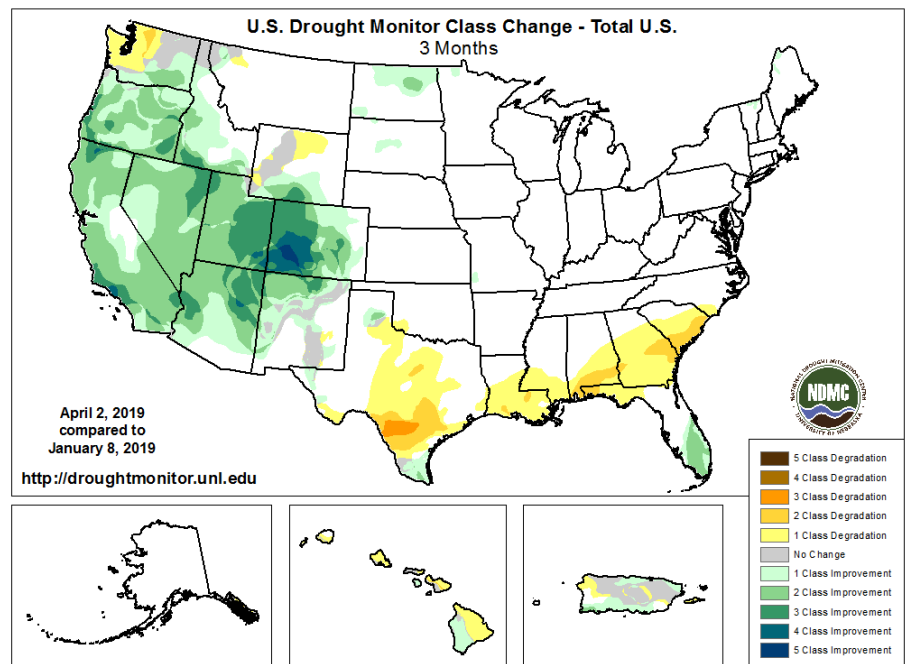
*The outlook integrates existing conditions with forecasts from the National Oceanic and Atmospheric Administration's Climate Prediction Center: [www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov).*

## National Summary

A large portion of the United States saw abundant precipitation and cool conditions during the first quarter of 2019. Precipitation was between 100% and 300% of normal for much of the West, Plains, Midwest, Northeast, Mid-Atlantic and Ohio River Valley, and many areas of the country saw temperatures ranging from near normal to 6 degrees below normal. Temperatures were even as much as 6 to 15 degrees below normal in Montana and the Dakotas. In contrast, parts of the South and much of the Southeast saw warm and dry conditions to start the year.

## Drought

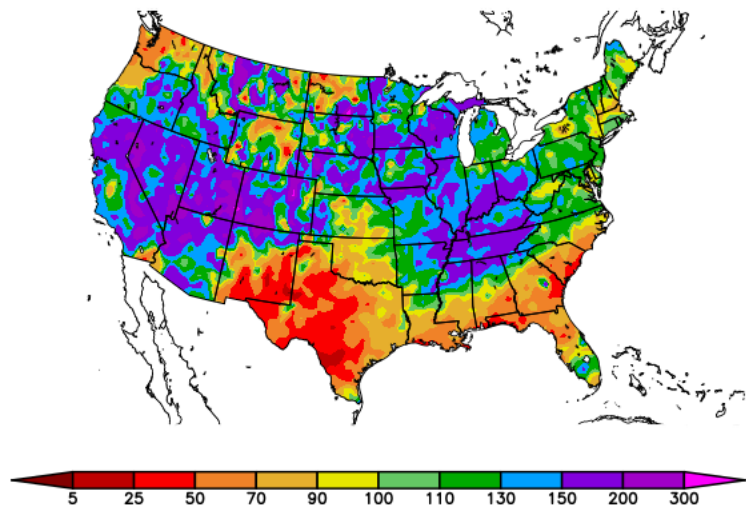
The wet conditions during the first three months of 2019 brought significant improvement to the areas of drought in the West with the majority of the region seeing at least 2-class drought improvement. Parts of southwest Colorado even saw 4- and 5-class drought improvement with the complete elimination of the areas of exceptional and extreme drought in the Four Corners region by the end of March. The area of severe drought in Oregon was also eliminated during the quarter, leaving the entire country free of extreme and exceptional drought by the beginning of April. The last few times this happened took place over brief periods in April and June of 2017 and in May of 2010. At the



### National Drought Mitigation Center

Significant drought improvement was found in the West where as much as 4- and 5-class improvements were found. In contrast, abnormally dry and drought conditions developed in parts of the South and Southeast.

### Percent of Normal Precipitation (%) 1/1/2019 – 3/31/2019



Generated 4/10/2019 at HPRCC using provisional data.

NOAA Regional Climate Centers

### High Plains Regional Climate Center

During the quarter, above normal precipitation was found across most of the country while dry conditions were found in New Mexico, Texas, and parts of the South and Southeast.

*Continued on page 4*

beginning of January, 2.75% of the country was in extreme drought and 0.95% of the country was in exceptional drought. The story was different in the South and Southeast, however, where warm and dry weather led to the development of abnormally dry to severe drought conditions in parts of Texas, Louisiana, Mississippi, Alabama, Georgia and South Carolina. But with the improvements in the West, the nationwide coverages of moderate and severe drought were still reduced from 18.69% to 5.43% and 9.13% to 1.05%, respectively. Subsequently, the population living in drought areas was greatly reduced from 51.4 million at the beginning of January to 9.3 million by the beginning of April.

## Precipitation

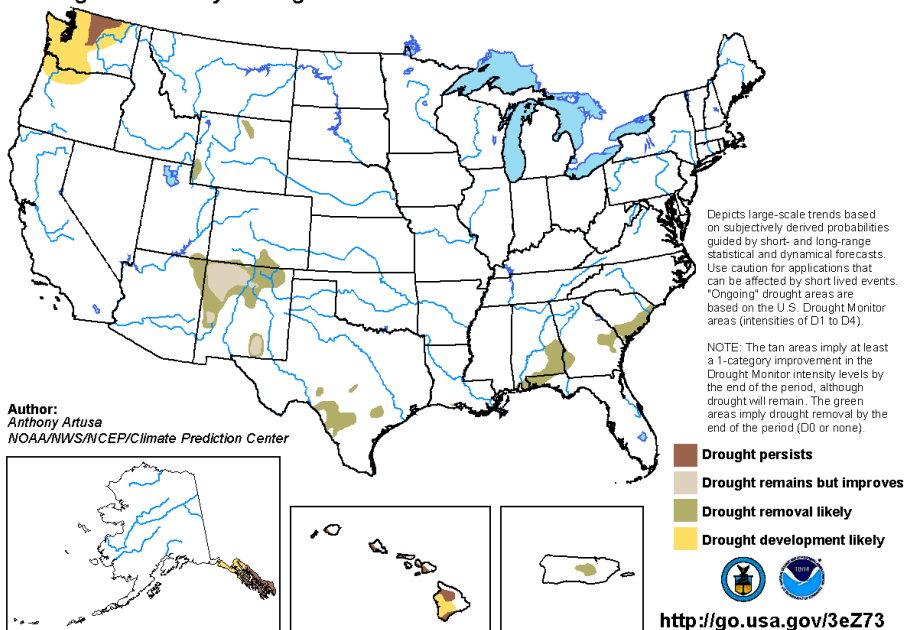
Much of the West, Plains, Midwest, Northeast, Mid-Atlantic and Ohio River Valley saw precipitation amounts between 100% and 300% of normal with parts of California and Tennessee seeing precipitation surpluses of 12 to 20 inches. Between these regions, 13 states made their top 10 wettest first quarters on record. Additionally, multiple cities in the West, Plains and Midwest saw their snowiest Februarys on record. On the other hand, northwest Oregon, northern and western Washington, much of New Mexico, Texas and Oklahoma, the southern tier of the Southeast and small pockets of the West, High Plains and Northeast saw precipitation deficits with amounts ranging between 5% and 70% of normal. The driest conditions compared to normal occurred in New Mexico and Texas where precipitation was only 5% to 25% of normal, while Washington saw its 10th driest January-March on record. Even with the dry conditions in parts of the country, the U.S. still saw its 13th wettest January-March on record and the second wettest February on record.

## Temperature

Much colder than normal conditions were found in Montana and the Dakotas where temperatures were

### U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

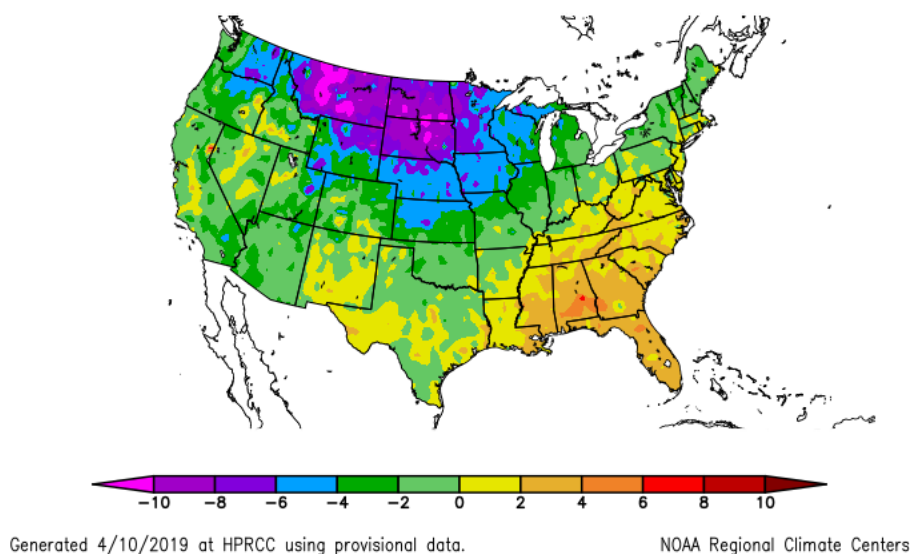
Valid for April 18 - July 31, 2019  
Released April 18



#### National Drought Mitigation Center

Drought will likely persist and expand in Washington, Oregon, Alaska, and Hawaii, but improve in the remainder of the CONUS and in Puerto Rico.

### Departure from Normal Temperature (F) 1/1/2019 - 3/31/2019



#### High Plains Regional Climate Center

While much of the CONUS saw cooler than normal conditions, Montana and the Dakotas were hit hardest with temperatures more than 8 degrees below normal.

Continued on page 5



Continued from page 4

6 to 15 degrees below normal during the quarter. February was especially cold with Montana and North Dakota seeing their second coldest Februaries on record. A majority of the remainder of the country was also cooler than normal during the quarter but to a lesser extent (slightly below normal to 6 degrees below normal). Slightly warmer than normal conditions (up to 3 degrees above normal) were found in small pockets of the West, Northeast, and Texas, and in the eastern portion of

the South and northern portion of the Southeast. The southern portion of the Southeast saw the warmest conditions with temperatures 3 to 6 degrees above normal. Florida even saw its ninth-warmest January to March on record and its third-warmest February on record.

## Outlook

Through the end of July, the area of drought in northern Washington

is likely to persist and spread south and west through Washington and into northwestern Oregon. Drought is also expected to persist and expand slightly in Alaska and Hawaii. On the other hand, drought improvement and removal is expected in all other areas of the continental United States and in Puerto Rico. □



### MONTHLY DROUGHT AND IMPACT SUMMARIES

For a more detailed review of conditions, please visit [drought.unl.edu/newsoutreach/monthlysummary.aspx](https://drought.unl.edu/newsoutreach/monthlysummary.aspx)

## Notable Numbers from Q1

The first quarter of 2019 has been defined in most of the U.S. by extreme precipitation. While some areas of the U.S., such as southeast Alaska, and its territories, including several of the U.S.-affiliated Pacific Islands, have grappled with myriad impacts of drought, most of the country has experienced little to no drought for substantial periods to begin 2019. Records have been broken and prolonged periods of drought have been broken. Here are several significant events that have happened so far in 2019.

**California became drought-free.** For the first time since December of 2011, the U.S. Drought Monitor reported that the Golden State had no drought to speak of. State and national news media reported extensively on the end of the streak once the March 14, 2019, USDM map was released. Though abnormally dry conditions can still be found in portions of the state, California's drought-free streak reached six weeks with the release of the April 18 USDM.

**Drought coverage reached record lows—more than once.** For the first time in the history of the USDM, only 3.73% of the Lower 48 states experienced drought during the week of April 18. Since the monitor's inception in 1999, there had never been a week when less than 4% of the Lower 48 had experienced drought. The record-

breaking week was preceded by a collection of record lows. Half of the 10 lowest Lower 48 drought coverage area statistics in the USDM's history have been recorded in 2019.

The historical lows extend to the total U.S. as well. April 18 marked the lowest percentage (3.78%) of drought reported across the U.S. as a whole. Only once prior, in May of 2017 (3.82%), had drought been experienced in less than 4% of the total U.S. area.

**Severe levels of drought or worse dropped below 1%.** In March, 1.03% of the total U.S. was experiencing severe drought (D2) or worse. That number dropped beneath 1% in April in several USDM reports.

**The Midwest has been free of drought and abnormally dry conditions, but not of floods.**

Beginning the week of February 26, drought observers located in the Midwest had nothing to report, leading to an eight-week period where the USDM reported 0% of the area experiencing drought or even abnormally dry conditions. During that time, however, extreme precipitation, combined with melting snow and ice, led to catastrophic flooding along the Missouri River and its tributaries.

-- Cory Matteson, National Drought Mitigation Center Communications Specialist

# Drought impact summary, 1st quarter 2019

By Denise Gutzmer

National Drought Mitigation Center  
Climatologist

## Ample snowfall eased drought in Southwest, while Southeast dried out

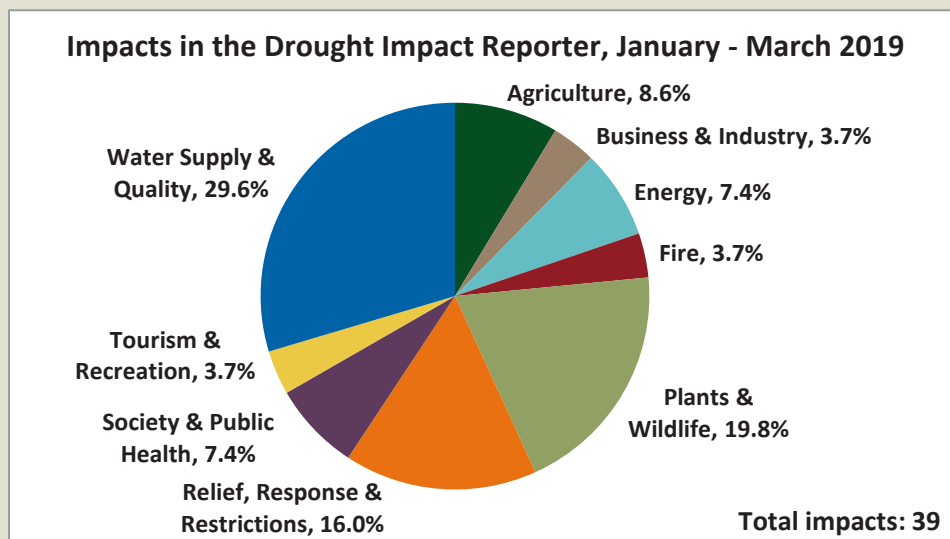
Bountiful snowfall graced the West in the first quarter of 2019, easing drought conditions in a part of the country prone to dry weather as states in the Colorado River Basin wrapped up a drought contingency plan. California became drought-free for the first time in several years, while winter took a dry turn in the south from Texas to South Carolina.

Alaska had eight impacts in the Drought Impact Reporter in the first quarter, mostly describing low water supplies for energy production. California and New Mexico had five impacts each, documenting curbs on water use and damage to trees. Altogether, 39 impacts were added to the DIR in the first three months of 2019.

## Low water supplies for Alaska hatcheries, hydropower

Years of below-normal precipitation in southeast Alaska reduced reservoir levels, threatening hatcheries and hydropower generation in the southeast part of the state. Low water supplies led the operators of the Macaulay Salmon Hatchery in Juneau to move salmon fry to the cold sea in January, months earlier than usual. Water from the reservoir was too warm for the fry, prompting the earliest ever move to net pens in the sea.

Low water supplies also meant trouble for energy production in southeast Alaska where hydropower provides the cheapest electricity.



National Drought Mitigation Center

Petersburg, Ketchikan and Wrangell were almost entirely relying on diesel fuel for electricity as their reservoirs ran too low to continue generating hydropower. On March 21, the Ketchikan council declared a public emergency and unanimously authorized Ketchikan Public Utilities to rent two additional diesel generators as dry weather continued and was forecast to persist.

[“Hatcheries the ‘canary in the coal mine’ as drought extends across Southeast Alaska,” by Jacob Resneck, Alaska Public Media \(Anchorage, Alaska\), March 1, 2019](#)

[“Citing drought, KPU to rent more diesel generators,” by Leila Kheiry, KRBD \(Ketchikan, Alaska\), March 21, 2019](#)

## Snowy winter alleviated California drought

After seven years of drought, California finally became drought-free in the March 14 release of the U.S. Drought Monitor. A winter of atmospheric rivers brought heavy precipitation, relieving the Golden State of all traces of drought, apart from the extreme northern and southern reaches where some vestige of abnormal dryness remained. Mid-December 2011 was the last time California was free of drought.

At the beginning of April, California’s snow water equivalent statewide was 45.1 inches for a

snowpack at 162% of normal, according to the state’s Department of Water Resources.

Although drought improved, California’s trees continued to bear the consequences of years of drought. The state lost another 18 million trees since the fall of 2017, a substantial number. But it was fewer than the 27 million dead trees counted in the fall of 2017 or the 62 million dead trees documented in the fall of 2016. The return to more rainfall and less drought has helped trees resist the bark beetles that have damaged and killed so many trees. Since drought began in 2010, roughly 147 million trees on 9.7 million acres have died. The slowing rate of tree mortality was promising.

[“California declared totally drought free for first time in seven years,” by Steve Gorman, Reuters, March 14, 2019](#)

[“How healthy is California snowpack? Snow survey site has 4th-best start to April ever,” by Michael McGough, The Sacramento Bee, April 2, 2019](#)

[“18 million trees died in California last year; officials say that’s an improvement,” by Alejandra Reyes-Verlarde, Los Angeles Times, Feb. 11, 2019](#)

*Continued on page 7*

## Forage, trees affected by New Mexico drought

Winter precipitation improved drought in New Mexico, but significant drought remained, despite the moisture. To compensate for the reduced forage on drought-stricken areas, the New Mexico State Land Office lowered grazing fees for ranches on State Trust land as drought increased operating costs. The fee was lowered about 1.79% from 2018. The Land Office leases roughly 8.8 million acres of State Trust land for livestock grazing.

Just as forage was hampered by drought, trees were also suffering on the New Mexico landscape. Forest mortality increased almost 50% in 2018 as extreme heat and drought made trees more susceptible to damage from insects. More than 120,000 acres of ponderosa, spruce, piñon and other trees died, according to an annual report on state forest health.

[“Grazing fees lowered on New Mexico State Trust land as ranchers contend with drought,” by Adrian C. Hedden, Carlsbad Current-Argus \(N.M.\), March 12, 2019](#)

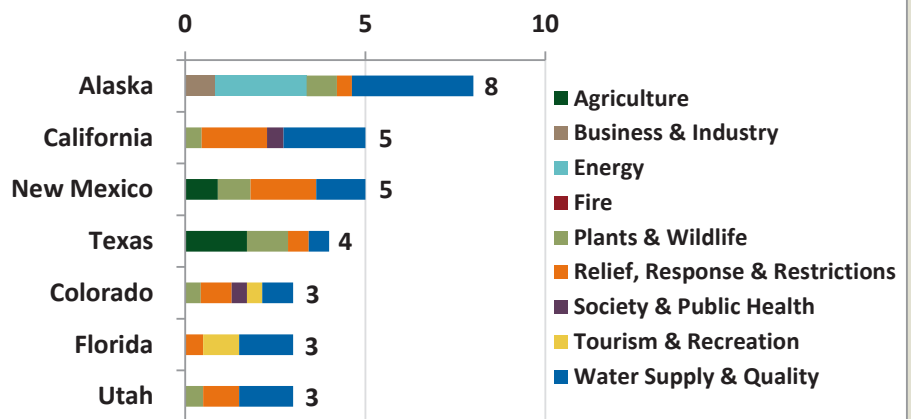
[“More trees dying in New Mexico,” by Thom Cole, Santa Fe New Mexican, March 24, 2019](#)

## Winter drought harming northern Colorado’s golf courses

Some golf courses in northern Colorado closed temporarily as the warm, dry winter drew more golfers out on the courses, increasing the wear, which can damage grass and lead to higher maintenance costs in the spring. Many municipal courses in the Fort Collins area were open, while some private ones had closed or introduced restrictions on cart use. The warm, dry conditions also allowed some golf courses to bring in record revenue for rounds played in January.

[“Dry weather causing some Northern Colorado golf courses to temporarily close,” by Miles Blumhardt, Fort Collins Coloradoan \(Colo.\), Feb. 1, 2019](#)

Impacts in the Drought Impact Reporter, January - March 2019



National Drought Mitigation Center

## Colorado River Drought Contingency Plan

The seven states in the Colorado River Basin completed their drought contingency plans to the satisfaction of the U.S. Bureau of Reclamation, after several missed deadlines in previous months. Under the plan, states committed to using less water and leaving that water in Lakes Mead and Powell to prevent the reservoirs from dropping too low to deliver water and generate hydropower. Representatives of the states met on March 19 to sign a letter, requesting that Congress support the plan. In early April, Congress approved the drought contingency plan.

Healthy snowpack in the Colorado River Basin was expected to improve runoff and water storage, reducing the likelihood of a shortage in the basin in 2020, delaying the eventual implementation of the drought contingency plan. The Bureau of Reclamation moved back the projection for a water shortage at Lake Mead from June 2019 to May 2020.

[“US official declares drought plan done for Colorado River,” by Felicia Fonesca, The Associated Press, March 19, 2019](#)

[“Colorado River drought plan clears 2 early hurdles in Congress,” by Andrew Nicla, Arizona Republic, March 28, 2019](#)

[“U.S. Congress approves Colorado River drought plan,” The Associated Press, The Denver Post, April 8, 2019](#)

[“This Winter Gave Us Record Snow and Rain, but What Did It Do for the Drought?,” by Elizabeth Whitman, Phoenix New Times, March 19, 2019](#) □

### DROUGHT IMPACT REPORTER



For more detailed reports, visit [droughtreporter.unl.edu](http://droughtreporter.unl.edu)



# New research examines drought effects on state recreation areas

By Cory Matteson

National Drought Mitigation Center  
Communications Specialist

Interviews with Nebraska state recreation area managers show how drought affects outdoor recreation and how resources like the U.S. Drought Monitor could be incorporated into a park management plan, according to recently published research.

The paper, “Drought impacts and management in prairie and sandhills state parks,” will appear in the June edition of the *Journal of Outdoor Recreation and Tourism* and is **available online now**. The lead author of the paper is Theresa Jedd, environmental policy specialist with the National Drought Mitigation Center. Co-authors include Devarati Bhattacharya, K-16 STEM Education Postdoctoral Fellow at the University of Nebraska-Lincoln School of Natural Resources; Cara Pesek, Nebraska Game and Parks public relations manager and Michael Hayes, applied climatologist and professor in the School of Natural Resources.

Jedd stated that even though Nebraska, overall, tends to have plentiful water resources, park managers are concerned with the possibility of experiencing dry years.

“Just like agricultural producers adjust their operations during droughts, managers mobilize park resources,” Jedd said. “A lot of this is behind the scenes, but data from our sample shows that the top management at state parks worry about drought for many reasons, from making sure that campers in tents have shade structures to prevent heat injuries to preventing long-term ecological damage. They’re also concerned with how flooding fluxes with drought and what the net effects are on the park wildlife and ecology.”

The research includes findings from interviews with eight Nebraska park superintendents. Jedd and



## NEBRASKAland Magazine/Nebraska Game and Parks Commission

Researchers interviewed Nebraska state recreation area managers at eight sites, including Calamus State Recreation Area, to learn how drought affects outdoor recreation.

her co-authors sought to learn how drought has affected outdoor recreation opportunities, and how parks are managed during drought. The superintendents, who voluntarily participated in the interviews, had recent drought experience from which to draw. The state has experienced two extended periods of “exceptional drought” in the past 18 years.

Park managers said that hot weather often led park users to take part in more water sports like boating or swimming, referring generally to times that may have qualified as periods of drought. While previous research has shown that weather events can blur together in memories, “nearly all of the managers immediately recalled the major drought event of 2012.”

The 2012 drought affected parks across the state. In Chadron, a

September wildfire burned 256,000 acres and resulted in the temporary closure of Chadron State Park. At Lake McConaughy State Recreation Area, only 8 inches of precipitation was measured at the Kingsley Dam weather station in 2012, the driest year on record. Cottonwood trees that are 60-70 years old continue to crack and fall along the banks of the popular reservoir due to the stress they experienced in 2012, the park superintendent told researchers.

The researchers cataloged an array of drought impacts upon ecoregions in areas of the state where superintendents were surveyed, as well as how drought can cause different impacts in each of the areas during the four seasons of a year. They found that, in times of drought, superintendents’

*Continued on page 9*

*Continued from page 8*

three primary management tactics were facilities maintenance (implementing watering plans, moving boat docks when water levels declined), ecological maintenance (cutting down or digging up dying trees, grazing wild meadows) and fire prevention (added signage, campfire bans).

Drought is considered a creeping phenomenon by those who study it, meaning that it does not announce its presence like other extreme weather events such as floods or tornadoes. While the superintendents who experienced the 2012 drought had clear memories after the event, and took steps during the drought, interview participants gave a wide array of answers as to how they determined that drought was happening. Not all managers reported using drought monitoring information and had differing perceptions of when a dry

spell becomes a drought. One said two to three weeks without much rain typically meant a drought was occurring, while another said that two months of abnormal dryness indicated drought. Several said that slowed water flow was a significant indicator. Another noted that hot, sunny conditions could coincide with a drought. However, large reservoir levels are not straightforward drought indicators, because lakes can be drawn down throughout the summer for irrigation needs.

“Several opportunities exist to advance park management toward drought resilience,” the paper states. “Currently, managers tend not to formally monitor drought and instead focus on short-term weather conditions, rather than longer climate trends. Given the magnitude of potential losses for the outdoor recreation sector, it would be advantageous for park managers to have a readily accessible

system with a set of indicators to assess the occurrence of drought and the necessary series of actions that follow. Connecting a spatial product such as the U.S. Drought Monitor with park communications may provide an early warning when droughts set in. Connecting this with a management plan or task force would prepare parks for droughts before they occur. Many of the appropriate actions are already underway, and future preparation could be as simple as documenting current adaptation strategies.”

This research was supported by the National Oceanic and Atmospheric Administration under a Climate Program Office/Sectoral Applications Research Program (SARP) competitive grant that funded the Decision and Risk Management Research Center (DRMRC) at the National Drought Mitigation Center at the University of Nebraska School of Natural Resources. □

## At Ethiopian space science workshop, NDMC climatologist sees promise in preparing for drought

**By Cory Matteson**

National Drought Mitigation Center  
Communications Specialist

In late 2018, Ethiopian officials announced that Ethiopia would join a growing number of African countries that have launched satellites of their own in an effort to further ramp up space science development across much of the continent.

The \$8 million observatory satellite will collect climate data after its expected September launch. Ethiopia is investing \$2 million in the project while China will fund \$6 million of the satellite's costs, as well as training and launch expenses.

National Drought Mitigation Center climatologist and remote sensing expert Tsegaye Tadesse said he sees the investment as a pivotal one.

“We are investing in the long-term,” said Tadesse, a research professor at

the University of Nebraska-Lincoln. “Down the road, the next generation will lead a better life. And therefore we have to help investing into the future as much as possible.”

In February, Tadesse participated in the first **African Initiative for Planetary and Space Science (AFIPS)** workshop, where researchers and leaders gathered to discuss the cultural, economic and societal impacts of space science development in Ethiopia and other African nations. Hosted by the **Ethiopian Space Science and Technology Institute**, the event brought together many on the forefront of African space science development

to share knowledge about building space programs and to discuss the challenges associated with them.

Tadesse, a featured panelist at the **University of Nebraska's Africa Summit** on March 28, has for years helped spearhead drought preparation efforts throughout Africa as scientific evidence points to more frequent and longer lasting droughts occurring in the Greater Horn of Africa due to climate change. In recent years, several African countries have invested in space science programs to address complex socioeconomic issues, with the changing climate chief among them. Nigeria, Kenya, Egypt and South

***“We are investing in the long-term. Down the road, the next generation will lead a better life. And therefore we have to help investing into the future as much as possible.”***

***– Tsegaye Tadesse***





#### National Drought Mitigation Center

Tsegaye Tadesse, a climatologist and remote sensing expert with the National Drought Mitigation Center, recently returned from a workshop in Ethiopia that centered around space science development. There, he spoke about how data from a soon-to-be-launched satellite will help Ethiopia better prepare for drought. Craig Chandler, University Communication.

Africa are among the countries that invested in satellite development prior to Ethiopia's late 2018 announcement.

At the AFIPS conference, remote sensing was one of five key topics, and Tadesse is a renowned proponent of its benefits and a longtime contributor to the body of research that utilizes satellite data. He recently collaborated on a project that created a combined drought indicator for Ethiopia (CDI-E) from four input variables measuring precipitation, land surface temperature, soil moisture and hydrologic conditions to characterize agricultural drought in the country. Tadesse said that the

Ethiopian government's investment in satellite technology can help the country retain some of its top scientific talent, which is why he is optimistic about the country's path forward.

**In a news release issued when the satellite development was announced last year,** Solomon Belay Tessema with the Ethiopian Space Science and Technology Institute at Addis Ababa University said the satellite will be used to collect data on water, agriculture, climate change and environmental protection.

"Our main goals by launching this first satellite are two," said Tessema, senior scientist and director general

of the institute. "The first one is build technology application capacity and skills of our engineers through collaborations with different countries' space scientists and institutions. So that they will be in a position to design, build and launch the second satellite independently. The second one is the direct support the first satellite gives to the social and economic development in terms of saving the money the country is currently spending for buying data, such as climate data."

When historic drought plagued the country in 2015–2016, food security for millions of Ethiopians reached crisis levels. In a country where about a quarter of the population lives in poverty, and 80% of the 108 million people live in rural or agrarian areas, Tadesse said that having satellite data could provide Ethiopian farmers with a vital tool that can help them determine the best way to deal with climate conditions. And it could also influence how the government allocates resources in dire times.

"You can give them an early warning to say that the start of the season is going to be delayed," he said. "Farmers are very clever, and they can adapt if they know that information. They can change the time of planting, and all kinds of other things can be done. At least if they get that information, they can make their own decision. That is from the farmer's point of view. And how about from the government point of view? Especially in developing countries, there's no safety net. You need to be ready before that disaster happens." □

# U.S.-affiliated Pacific Islands now part of U.S. Drought Monitor

**Cory Matteson**

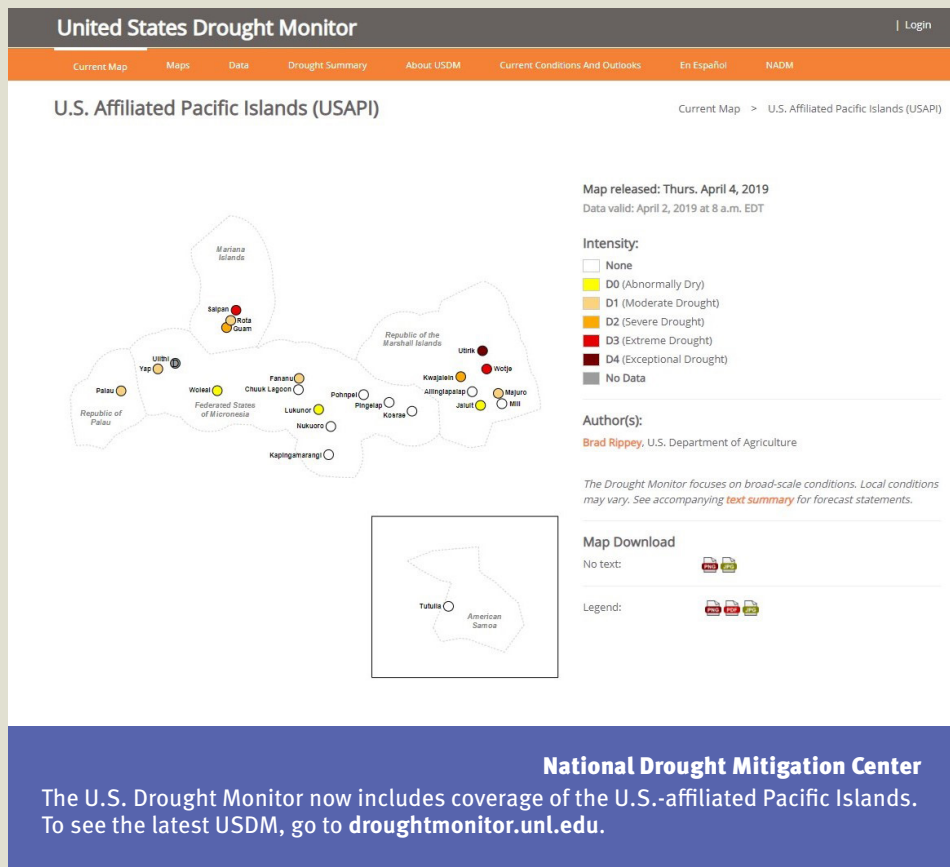
National Drought Mitigation Center  
Communications Specialist

For nearly 20 years, the U.S. Drought Monitor has provided week-by-week drought assessments for the continental United States, Alaska, Hawaii and, soon after the map's debut, Puerto Rico. Over that time, advances in technology and an expanding network of local observers have helped make the map a key resource in triggering both drought-related disaster declarations and responses to drought from state, local, tribal and basin-level decision makers.

In April, for the first time since 2000, the USDM added a new collection of territories to the weekly map. The U.S.-affiliated Pacific Islands (USAPI) are now included in the weekly report of drought. The USAPI consist of three U.S. territories and three independent countries in free association with the U.S. The territories are American Samoa, Guam and the Commonwealth of the Northern Mariana Islands. The independent countries are the Federated States of Micronesia, the Republic of the Marshall Islands and the Republic of Palau.

Located in five time zones across an expanse of the Pacific Ocean larger than the North American continent, the USAPI are a collection of isolated islands that, as a 2017 U.S. Geological Survey report stated, "are generally perceived as having wet climates." But the territories are also vulnerable to episodic drought, according to the report. Drought in the USAPI can lead to crop damage, wildfires and low stream outputs where streams exist, according to a report compiled by Richard Heim, a meteorologist with the National Climatic Data Center and one of the authors of the USDM.

On April 8, the USDM published a narrative of current drought conditions across the USAPI by Brad



Rippey, a meteorologist with the U.S. Department of Agriculture. Rippey reported that while most of the southern and eastern islands are free of dryness and drought, low rainfall totals have led to drought conditions in the northern and western islands. According to Rippey, low rainfall totals across the Marianas have led to drought declarations in Saipan, Guam and Rota while a short-term drought across the Marshall Islands has left Utirik experiencing exceptional drought (D4-S).

Incorporating the USAPI into the U.S. Drought Monitor has been a project several years in the making. Starting this month, users of the USDM will be able to see if drought is impacting the territories as part of the weekly report.

The USDM also recently updated its mapping of Alaska. The map now

displays the Aleutian Islands separately. To see the latest USDM, go to [droughtmonitor.unl.edu](http://droughtmonitor.unl.edu).



# Water conservation tips for drought, flood and other disasters

On March 17, residents of Lincoln, Nebraska, home to the National Drought Mitigation Center and University of Nebraska-Lincoln, were ordered to conserve water not because of drought, but because of flooding. The disastrous floods that impacted much of the state also affected production at the Lincoln Water System.

For three days, the city mandated that commercial and industrial users curb water use by 25 percent and that residential users curb indoor use by 50 percent. Outdoor water use was prohibited. Car washes were shut down. Restaurants were required to serve food and beverages in disposable containers. In the event that conservation efforts had failed to temper water usage, the city's mayor could have ordered the city to raise water rates, which the Lincoln Journal Star reported was "originally intended for drought-related emergencies."

The drought center works locally and around the world to help people prepare for drought ahead of time and to recognize emerging drought as soon as possible, and recommends that people follow the guidance of their local water provider as to when and how to conserve water.

Here is a collection of water conservation tips from across the U.S.

- In Lincoln, city officials this week released a 50-tip guide to conserving water during the mandatory restriction period. Tips included steaming vegetables rather than boiling them, washing only full loads of laundry and collecting tap water for other uses (watering plants, hydrating pets) while waiting for it to heat. (<https://urlzs.com/Zqwu>)
- Recently, California experienced its first drought-free week in over seven years, but residents have adapted to life in a state prone to dry spells or



**Staff Sgt. Herschel Talley, Nebraska National Guard**

Historic flooding caused extensive damage throughout Nebraska in Mid-March. Camp Ashland was flooded after a levy to the north of the camp broke and thousands of gallons of water poured from the Platte River into low-lying areas. The Lincoln Water System is located in the Ashland area, and damage to the facilities led Lincoln officials to implement water restrictions for three days.

worse. In 2014, the state's governor asked residents to curb water use by 20 percent, and the state's public utilities commission released tips on how to conserve water. A year later, the New York Times asked Californians how they had adapted. Among the answers: collected shower water saved for outdoor plants, low-flow toilets and native plants in lieu of lawns. (<http://urlzs.com/ouSz>)

- In March, the Environmental Protection Agency held Fix a Leak Week. According to the EPA, 10 percent of homes in the U.S. have leaks that waste 90 gallons of water or more a day. Repairing or replacing leaky faucets, toilets or spigots

can save homeowners up to 10 percent on their water bills and help toward reducing the 1 trillion gallons of water wasted in the U.S. each year. (<https://urlzs.com/YDAF>)

- The Center for Disease Control notes that, even during times of restricted water use, hygiene and sanitation should not be neglected. In a guide for protecting public health during times of drought, the CDC recommended installing low-flow faucet aerators on sinks to reduce water use while also providing enough water to wash hands and produce. (<https://urlzs.com/5sLk>) □

# Upcoming events

**Universities Council on Water Resources/National Institutes of Water Resources Annual Water Resources Conference**, June 11–13, Snowbird, Utah, an annual event that examines challenges facing the water community and brings leading researchers, educators, water managers and other professionals from across the country together to address them. National Drought Mitigation Center climatologist Brian Fuchs will present on the U.S. Drought Monitor and how it identifies drought.

To register and learn more, go to [ucowr.org/2019-conference](http://ucowr.org/2019-conference).

**U.S. Department of Agriculture Drought Workshop**, May 7, Juneau, Alaska, an event designed to prepare stakeholders to transition from a “snow to rain dominant system.” Climatologist Deborah Bathke of the National Drought Mitigation Center will present at the workshop and be joined by representatives from the USDA Northwest Climate Hub. Attendees “will get a better

sense of drought, impacts of drought and interconnections in southeast Alaska to help refine drought thresholds.”

Registration is closed. For more information contact [holly.prendeville@usda.gov](mailto:holly.prendeville@usda.gov).

**U.S. Drought Monitor Forum**, Sept. 17–19, Bowling Green, Kentucky, a biennial event organized by the National Centers for Environmental Information (NCEI), Climate Prediction Center (CPC), Kentucky Division of Water, and Kentucky Climate Center at Western Kentucky University. The meeting was originally scheduled in March but postponed due to the government shutdown. Topics include the history of the U.S. Drought Monitor, drought in Kentucky and the Midwest, new drought monitoring products and more. Please contact [Richard.Heim@noaa.gov](mailto:Richard.Heim@noaa.gov) or [David.Miskus@noaa.gov](mailto:David.Miskus@noaa.gov) if you have specific questions about the USDM Forum.

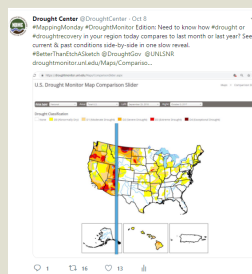
Registration is free and limited to the first 100 attendees. To register,

go to the National Drought Mitigation Center’s registration page: [drought.unl.edu/Registration.aspx?id=963](http://drought.unl.edu/Registration.aspx?id=963).

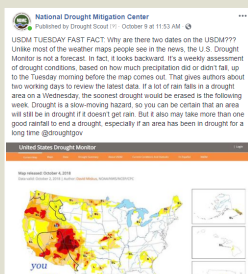
**Aspen Global Change Institute Next-Generation Food Shock Modeling**, May 19–24, Aspen, Colorado, a workshop that will facilitate transformational change and science-based foresight by bringing together climate, agriculture, health and nutrition, trade, security, and humanitarian aid expertise to advance next-generation tools and decision support systems that confront current and future challenges to food security and improved nutrition. National Drought Mitigation Center Director Mark Svoboda is an organizer and facilitator of the workshop and will be in attendance. This workshop will focus on understanding interactions among complex processes spanning multiple disciplines, systems, and scales.

Participation is by invitation only. To learn more, go to [www.agci.org/contact](http://www.agci.org/contact). □

## NDMC IN SOCIAL MEDIA



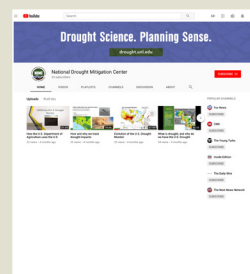
Follow us on Twitter:  
[@DroughtCenter](https://twitter.com/DroughtCenter)



Find us on Facebook:  
[/NationalDroughtMitigationCenter](https://www.facebook.com/NationalDroughtMitigationCenter)



Subscribe to Dry Horizons:  
[go.unl.edu/ndmc-dry](http://go.unl.edu/ndmc-dry)



Tune in with us on YouTube:  
[go.unl.edu/droughtflix](https://go.unl.edu/droughtflix)